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BEHAVIORAL PROGRAM

Our training methods are based on modified operant conditioning techniques (as proposed by B.F. Skinner) combined with inputs from ethological, ecological and other biological disciplines.

We have deviated from the classical and somewhat simplistic Skinnerian and pavlovian views because of our recognition of the complex nature and importance of the relationship between internal biological mechanisms and external environmental factors. We recognize even the simplest conditioned behavior is actually a more or less complicated behavioral chain or sequence.

Our approach to situations [redacted] is one of engineering design rather than statistical experimental research. Experiments tend to be of the go—no go type, with few subjects and with a subject acting as its own control. Requirements for data are kept to a minimum commensurate with answering questions vital to the success of the mission. Our engineering design is based on program goals, our knowledge of the animals in question, the anticipated environmental situation, degree of behavioral control required, equipment available and cost of time factors.

The training plan is tailored to fit the requirements of the engineering design. Critical aspects or probable problem areas of the proposed behavioral chain are identified and avenues of approach are initiated immediately. Problems of a critical nature we try to attack on more than one front simultaneously. The data requirements are included in the training plan.

Our training plan also includes milestones but the milestones seldom have dates attached. It is difficult to predict the "building rate" of behaviors, especially under the conditions of poor control of environmental factors such as might occur outside the laboratory. Training is a growth process and to push ahead on a fixed schedule without maintaining a firm behavioral base is an unwise practice and courts long-term disaster.

Daily training programs are constructed for each animal based on his previous record--particularly the previous day's record, but also using the earlier records of rate of progress, incidence of regression, health conditions, etc. Occasionally routine steps of progress such as increasing range a certain number of yards are sacrificed for increased accuracy of discrimination, polishing certain skilled terminal behaviors, correcting or extinguishing problem behaviors and the like.

Very little quantitative or qualitative experimental evidence exists on long chains of behavior such as are involved in the present project. There are little data available on extensibility of secondary reinforcement over a long time periods of high effort tasks. The evidence available now, however slight it may be, must form the basis of our present design and we must gather the necessary data for future engineering designs. In view of the paucity of pertinent evidence a certain amount of art, skill, evaluation and educated guess-work must be used in judging how far animals can be stretched each day, when new stimulus situations can be introduced and when behavioral links can be dropped without disrupting the whole chain.

SPECIFICS:

From September through December of 1967, we analyzed the program goals and requirements.

The goals were to get the vehicle to a remote point and back again. A simple terminal behavior may be required. The guidance system must utilize the capabilities of an R F Link.

In our analysis, two areas seemed to be most critical and in need of investigation, development and selection of guidance methods and establishing a maximum range capability.

We proposed several approaches to the guidance problem, one of which was not directly compatible with the R F Link. We proposed to assess the efficacy of continuous information input systems and intermittant information inputs systems as well as compare positive information systems with negative information systems.

Once the system(s) of choice had been selected, we proposed to gather data on range extension. We were interested in biological factors such as attention span, physical endurance, total range and effect of different reinforcement schedules.

Once we had a sufficient amount of data to support that the system could possibly achieve the desired range we proposed to incorporate [redacted] behaviors and attempt to achieve maximum range. Included at this time also would be the systems integration aspects.

The training protocol involves systematically increasing the complexity and skill level of the animal responses under the conditions of an expanding and frequently changing environment.

We conditioned the animals to search for targets and respond to the targets once they found them. We supplied auditory cues to the animals to aid them in their search for targets. We also attempted to train an animal without the use of targets but the results in comparison to the target situation were poor.

The auditory cues were a continuous signal when the animal was heading towards the proper target, a signal meaning turn to the left (target on left) and a signal meaning turn right (target on right). These signals were used in different combination for different animals depending on the particular approach in training. The basic approaches were: On course
Left/Right
On course--Left/Right
Whether the guidance signals were continuous or intermittant was another variable in our training scheme.

The initial training is accomplished with the relatively sterile confines of a small [redacted] pen--essentially an oversized skinner box!

Once the behavior was established in the small pen we moved to a larger pen with a more complex environment and also introduced gate training and more extensive handling procedures.

By this method of continual environmental and behavioral expansion we moved the animals outside the compounds.

The data kept during most of the training sessions were numbers of trials, positions and range of targets, number of correct choices, environmental factors and occasionally time per trial number of course corrections and, most importantly and at all times, a detailed record of behavioral observations.